

Current and proposed technologies allow consumer electronic devices to be connected in a home or office network and to transfer audio information, video information and other data to each other over a network bus. For the discussion herein, terms such as "consumer electronic device" and "network" are not limited to any form or type of device nor to any type of distribution network or data format. For the discussion herein, the present invention is discussed in the context of a home network comprising familiar consumer electronic devices interconnected by hardware using a serial bus and communicating via a standard protocol.

Figure 2 illustrates an exemplary network 210 that can support embodiments of the present invention. Network 210 comprises consumer electronic devices including personal computer systems, and can be extended to incorporate other electronic devices in different combinations than those illustrated.

Network 210 includes an integrated receiver/decoder device such as intelligent controller device 212, video camera 214, television 216, personal computer 218, receiver 220, video cassette recorder (VCR) unit 222, and compact disk (CD) unit 224 that are coupled together in network 210 by a network interface (e.g., bus 230). The consumer electronic devices are each considered a logical entity represented as a node on network 210, with a unique address, a set of control registers, and volatile and non-volatile memory

units (refer to Figure 3, below). The consumer electronic devices in network 210 are capable of interacting with each other on a peer-to-peer basis, and data, commands and the like can be sent between the devices within network 210.

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In the present embodiment, bus 230 is a bus compliant with IEEE 1394. Accordingly, the consumer electronic devices of network 210 communicate over bus 230 using a protocol compliant with IEEE 1394 such as AV/C (audio visual control) protocol. Other embodiments of the present invention are operable within a network of consumer electronic devices compliant with the home audio/visual interoperability (HAVi) architecture that is known in the art. However, it is understood that other protocols, buses, network interfaces and network architectures may be utilized in accordance with the present invention.

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The IEEE 1394 serial communication bus carries both commands and status information as well as digital audio and digital video signals between devices. One significant attribute of the IEEE 1394 technology is isochronous data flow. Connections may be point-to-point or utilize just sources or just sinks (also referred to as "broadcast-out" and "broadcast-in" connections). Sources are units or subunits that provide information and data to sinks.

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Continuing with reference to Figure 2, controller device 212 is an intelligent controller device. Controller device 212 is a system

component/software element in network 210 that controls a target device (e.g., the other consumer electronic devices of network 210). Although controller device 212 is shown as a separate device in network 210, it is understood that network control can be provided by any of the devices in the network having sufficient resources (e.g., processing and memory resources). It is also appreciated that controller device 212 may be coupled to network 210 via a wireless connection (e.g., an infrared or radio frequency connection); refer to Figure 4A, below.

Controller device 212 communicates with a user through a graphical user interface via some type of input/output device. The user's input/output device can be a number of well known devices including, for example, a remote control, a keyboard, a mouse or other cursor directing device, or a joystick, or a combination of these. In one embodiment, the input/output device is a hand-held remote device comprising a plurality of buttons that are manipulated by the user in order to control the devices on the network.

Controller device 212 of Figure 2 is typically coupled to a display device that enables the user to view menus or messages, and that also displays the user's input as the user enters it via the input/output device. The display device may be incorporated into controller device 212 or it may be separate from controller device 212; for example, television 216 could be used in conjunction with controller device 212 to display menus and messages to the user.